

1       What is claimed is:

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3 1.       An apparatus for mixing and injecting or applying a viscous material comprising:

4       two or more holding tanks each having a viscous component and an exiting port; and

5       two or more synchronously coupled pumps each having an intake port and a discharge port,  
6 each intake port connected with one of said holding tank exiting ports; and

7       a dispensing and mixing head connected with said discharge ports whereby said viscous  
8 material components enter said dispensing and mixing head via the action of said pumps upon  
9 actuation of said dispensing and mixing head and are mixed and exit said dispensing and mixing head  
10 at an open end as a viscous blend.

11

12 2.       The apparatus for mixing and injecting or applying a viscous material as set forth in claim 1  
13 said pumps each further comprising:

14       a cylinder and piston combination, said piston having an attached connecting rod and a  
15 connecting rod external end extending external to said cylinder; and

16       one or more check valves in said combination, said one or more check valves having a spring  
17 biasing said check valves against a valve seat, whereby said valve is positively closed when said  
18 viscous material is not flowing through said valve seat.

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20 3.       The apparatus for mixing and injecting or applying a viscous material as set forth in claim 2  
21 said pumps each further comprising:

22       one of said check valves within said piston and one of said check valves within said intake  
23 port, whereby said check valve within said piston opens as said piston moves toward said intake port  
24 and said valve within said piston closes as said piston moves away from said intake port and said  
25 check valve within said intake port opens as said piston moves away from said intake port and said  
26 valve within said intake port closes as said piston moves toward said intake port, whereby said  
27 viscous material flows from said discharge port upon movement of said piston in either direction.

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29 4.       The apparatus for mixing and injecting or applying a viscous material as set forth in claim 1

1 further comprising:

2        said pumps having a cylinder and piston combination, said piston having an attached  
3 connecting rod and a connecting rod external end extending external to said cylinder; and

4        a hinged plate having a first side and a second side and a pivotably held hinge axis between  
5 said first and second side; and

6        a drive having a displacement  $d_1$  and connected with said first side a distance  $L_1$  from said  
7 hinge axis; and

8        said one or more pumps each slideably placed and secured upon said second side a distance  
9  $L_2$  from said hinge axis, whereby displacement  $d_1$  of said drive causes connecting rod displacement  
10  $d_2$  substantially in a ratio:

$$d_2 = \frac{d_1}{L_1} * L_2$$

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13  
145.        The apparatus for mixing and injecting or applying a viscous material as set forth in claim 4  
15 said drive further comprising:

16        a hydraulic cylinder having an extension rod pivotably connected with said first side; and  
17        one or more limit switches mounted near said hinged plate and capable of sensing one or more  
18 positions of said hinged plate; and

19        a hydraulic valve actuated by said limit switches whereby a hydraulic fluid flows into a first  
20 portion and out of a second portion of said hydraulic cylinder thereby causing said extension rod to  
21 extend and when directed by said limit switches allows said hydraulic fluid to flow out of a first  
22 portion and into a second portion of said hydraulic cylinder thereby causing said extension rod to  
23 retract.

24

256.        The apparatus for mixing and injecting or applying a viscous material as set forth in claim 4  
26 said pumps each further comprising:

27        a cylinder and piston combination, said piston having an attached connecting rod and a  
28 connecting rod external end extending external to said cylinder; and

29        two or more check valves in said combination, said check valves having a spring biasing said

1 check valves against a valve seat, whereby said valve is positively closed when said viscous material  
2 is not flowing through said valve seat.

3

4 7. The apparatus for mixing and injecting or applying a viscous material as set forth in claim 6  
5 said pumps each further comprising:

6 one of said check valves within said piston and one of said check valves within said intake  
7 port, whereby said check valve within said piston opens as said piston moves toward said intake port  
8 and said valve within said piston closes as said piston moves away from said intake port and said  
9 check valve within said intake port opens as said piston moves away from said intake port and said  
10 valve within said intake port closes as said piston moves toward said intake port, whereby said  
11 viscous material flows from said discharge port upon movement of said piston in either direction.

12

13 8. The apparatus for mixing and injecting or applying a viscous material as set forth in claim 1,  
14 one or more of said holding tanks further comprising:

15 one or more auger feeds positioned within said tanks in such a manner as to promote feeding  
16 of said viscous material into said exiting port.

17

18 9. The apparatus for mixing and injecting or applying a viscous material as set forth in claim 1,  
19 one or more of said holding tanks further comprising:

20 one or more cavities having a heat transferring liquid attached with one or more of said tanks;  
21 and a heating element positioned near or within said cavity whereby heat is transferred to said heat  
22 transferring liquid and thereby uniformly heats said viscous material.

23

24 10. The apparatus for mixing and injecting or applying a viscous material as set forth in claim 9,  
25 one or more of said holding tanks further comprising:

26 one or more auger feeds positioned within said tanks in such a manner as to promote feeding  
27 of said viscous material into said exiting port.

28

29 11. The apparatus for mixing and injecting or applying a viscous material as set forth in claim 1,

1 said dispensing and mixing head further comprising:

2 two or more pin type compound valves connected with a valve actuator; and

3 a valving block having two or more viscous compound entrance holes and two or more  
4 bores, said compound valves slidably engaged and sealed with said bores; and

5 a mixing block having two or more compound chambers respectively sealingly engaged with  
6 said bores and two or more mixture exiting holes; and

7 a mixing chamber sealingly engaged with said mixture exiting holes and having said open end  
8 whereby said viscous blend exits said dispensing and mixing head.

9

10 12. The apparatus for mixing and injecting or applying a viscous material as set forth in claim 11,  
11 said dispensing and mixing head further comprising:

12 an air spray nozzle mounted on said dispensing and mixing head; and

13 a compressed air supply and an air valve connected between said compressed air supply and  
14 said air spray nozzle, whereby a compressed air spray is provided upon actuation of said air valve.

15

16 13. The apparatus for mixing and injecting or applying a viscous material as set forth in claim 11,  
17 said dispensing and mixing head further comprising:

18 a seal plate between said valving block and said mixing block and having two or more recesses  
19 and two or more O-rings within said recesses and two or more passages communicating with said  
20 bores and said compound chambers respectively; and

21 said mixing chamber further comprising a static mixer.

22

23 14. The apparatus for mixing and injecting or applying a viscous material as set forth in claim 4  
24 further comprising:

25 two or more slots on said second side of said hinged plate and two or more clevis's moveably  
26 attached with each of said slots respectively and each of said connecting rod external ends connected  
27 with one of said clevis's whereby said one or more pumps are each slideably placed and secured upon  
28 said second side and allow for variable ratio synchronous pumping.

29

1 15. The apparatus for mixing and injecting or applying a viscous material as set forth in claim 1  
2 further comprising:

3 a carriage upon which said two or more holding tanks and said two or more synchronously  
4 coupled pumps are mounted; and

5 one or more raisable and lowerable terrain drives mounted with said carriage; and

6 one or more rail followers mounted with said carriage whereby said carriage is driven by said  
7 terrain drive when lowered and said rail followers cause said carriage to follow one or more railroad  
8 rails.

9

10 16. The apparatus for mixing and injecting or applying a viscous material as set forth in claim 4  
11 further comprising:

12 a hinged cradle having two or more pump rings and mounting brackets; and

13 said cylinders attached with said pump rings and said pump rings pivotably attached with said  
14 mounting brackets; and

15 said connecting rod external ends slideably connected with said second side of said hinged  
16 plate.

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18 17. An apparatus for mixing and injecting or applying a viscous material comprising:

19 two or more synchronously coupled pumps capable of pumping a viscous material each having  
20 an intake port and a discharge port; and

21 said pumps comprising a cylinder and piston combination, said piston having an attached  
22 connecting rod and a connecting rod external end extending external to said cylinder; and

23 two or more check valves in said combination, said two or more check valves having a spring  
24 biasing said check valves against a valve seat, whereby said valve is positively closed when said  
25 viscous material is not flowing through said valve seat; and

26 one of said check valves located within said piston and one of said check valves located within  
27 said intake port, whereby said check valve within said piston opens as said piston moves toward said  
28 intake port and said valve within said piston closes as said piston moves away from said intake port  
29 and said check valve within said intake port opens as said piston moves away from said intake port

1 and said valve within said intake port closes as said piston moves toward said intake port, whereby  
2 said viscous material flows into said intake port and out said discharge port upon movement of said  
3 piston in either direction.

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5 18. The apparatus for mixing and injecting or applying a viscous material as set forth in claim 17  
6 further comprising:

7 two or more holding tanks each having said viscous material components and an exiting port  
8 connected with said intake ports of said pumps respectively; and

9 a dispensing and mixing head connected with said discharge ports whereby said viscous  
10 material components enter said dispensing and mixing head via the action of said pumps upon  
11 actuation of said dispensing and mixing head and are mixed and exit said dispensing and mixing head  
12 at an open end as a viscous blend.

13

14 19. An apparatus for mixing and injecting or applying a viscous material comprising:

15 two or more holding tanks each having a viscous component and an exiting port and one or  
16 more auger feeds positioned within said tanks in such a manner as to promote feeding of said viscous  
17 component into said exiting port and one or more cavities substantially surrounding each of said tanks  
18 and having a heat transferring liquid and one or more heating elements whereby heat is transferred  
19 to said heat transferring liquid and thereby uniformly heats said viscous material; and

20 two or more synchronously coupled pumps driven by one or more drives, each having an  
21 adjustable variable ratio of pumping displacement relative to the other pumps, and each pump having  
22 an intake port and a discharge port, each intake port connected with one of said holding tank exiting  
23 ports; and

24 said pumps each further comprising a cylinder and piston combination, said piston having an  
25 attached connecting rod and a connecting rod external end extending external to said cylinder and a  
26 first normally biased closed check valve within said piston and a second normally biased closed check  
27 valve within said intake port, whereby said check valve within said piston opens as said piston moves  
28 toward said intake port and said check valve within said piston closes under said bias as said piston  
29 moves away from said intake port and said check valve within said intake port opens as said piston

1 moves away from said intake port and said check valve within said intake port closes under said bias  
2 as said piston moves toward said intake port, whereby said viscous material flows from said discharge  
3 port upon movement of said piston in either direction.

4 a dispensing and mixing head connected with said discharge ports whereby said viscous  
5 material components enter said dispensing and mixing head via the action of said pumps upon  
6 actuation of said dispensing and mixing head and are mixed and exit said dispensing and mixing head  
7 at an open end as a viscous blend.

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9 20. The apparatus for mixing and injecting or applying a viscous material as set forth in claim 19,  
10 said dispensing and mixing head further comprising:

11 two or more pin type compound valves connected with a valve actuator; and

12 a valving block having two or more viscous compound entrance holes and two or more bores,  
13 said compound valves slidably engaged and sealed with said bores; and

14 a mixing block having two or more compound chambers respectively sealingly engaged with  
15 said bores and said compound valves when closed and two or more mixture exiting holes; and

16 a static mixer sealingly engaged with said mixture exiting holes and having said open end  
17 whereby said viscous material enters said compound entrance holes upon opening of said compound  
18 valves flows into said compound chambers and through said mixture exiting holes and into said static  
19 mixer and thereafter exits said dispensing and mixing head as a viscous material blend.

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